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Fighting fit?

Assessing New Zealand's fiscal sustainability

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Authorship

Each year NZIER devotes resources to undertake and make freely available economic research and thinking aimed at promoting a better understanding of New Zealand's important economic challenges. This paper was funded as part of this public good research programme.

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Key points

New Zealand faces a huge fiscal cost from an ageing population...

- Over the next few decades, the unprecedented impacts of an ageing population will put government finances under immense pressure.
- Without significant changes in fiscal policy, government debt is projected to head towards 200% of GDP by 2060.
- Clearly this is not feasible. Unpalatable change will be forced upon us by external lenders long before we get to that degree of debt.
- But the underlying message is simple: we cannot afford the same spending patterns and tax settings as in the past. Something has to give, and we have to start thinking about the trade-offs sooner rather than later.

...so we need to start making tough fiscal decisions now

- New Zealand is in a good fiscal position to start contemplating these longer term challenges.
- Recent efforts to get the books back in black after the Global Financial Crisis and the Christchurch earthquakes have been commendable.
- But the focus needs to start moving away from concerns about short term vulnerability and towards preparing for the pressures of an ageing population.

We have the room to make adjustments...

- Our analysis shows that, relative to many of our OECD peers, we have ample flexibility to start lifting tax rates – over time – without taxation distorting the incentives to work and invest so much that revenue falls.
- Of course, caution needs to be taken when determining the optimal level and rate of change of taxes. The evidence shows that overly high taxes can be harmful to economic growth.
- In reality, we would expect fiscal adjustments to come about through a combination of lower government spending, broadening the tax base as well as lifting existing taxes.

...and history shows our politicians do respond to increases in debt by adjusting taxes or spending

- Looking back over a century, we show empirically that New Zealand governments have reacted to higher public debt levels by changing fiscal policy settings.
- This – along with sound fiscal management in recent years – is a key reason why New Zealand doesn't face the same accumulated structural imbalances that other countries (e.g. the US, some countries in the euro areas) are struggling with.

The sooner changes are made, the less chance that politics comes to dominate sound economics

- The US and euro area experiences have shown that when necessary fiscal adjustments are postponed because they are politically unpopular in the short term, the medium to longer term corrections are economically painful and sub-optimal.
- We recommend the New Zealand government starts the process of spreading out the huge costs of an ageing population as soon as possible. Initial options for the government to explore include:
  - Seeking a bipartisan agreement on meeting the costs of superannuation
  - Focusing the social safety net on those who need it most, rather than the middle class
  - Broadening the tax base to include a tax on land or a tax on capital gains
  - Better highlighting the choices of taxes and spending that are feasible for any given level of debt level over the next few decades so that Kiwis' expectations can be better managed, and so that they start preparing themselves for a tighter fiscal future.

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1. The costs of ageing have increased vulnerabilities

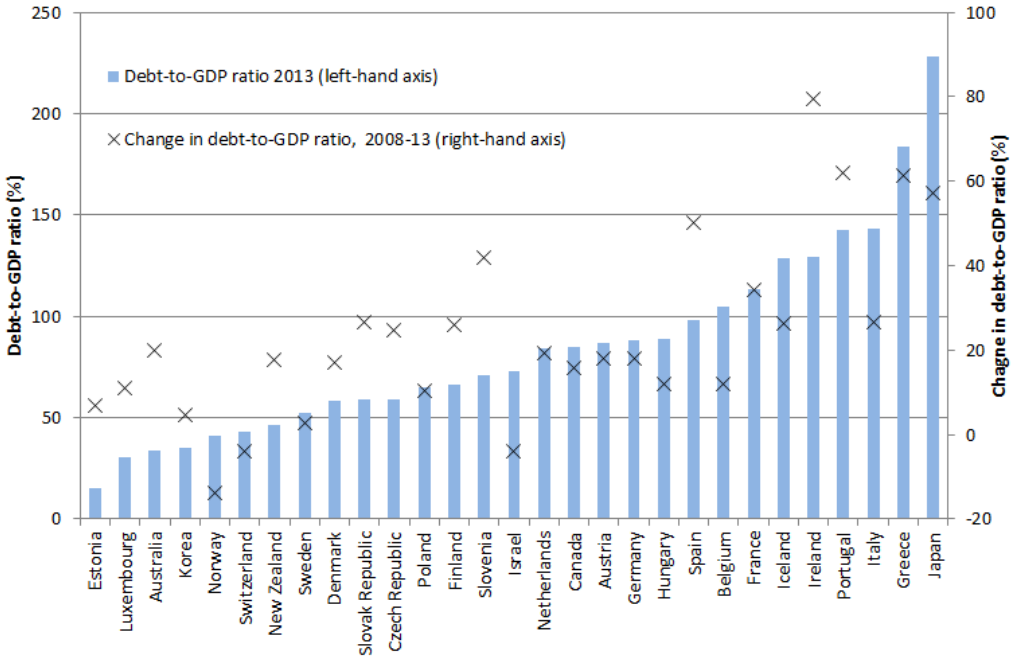
The Global Financial Crisis has resulted in vulnerabilities in the short-run fiscal position of many advanced economies. Debt levels rose markedly. The risk of sovereign default increased the cost of borrowing for many countries. This change highlights the long-run vulnerabilities for most countries associated with funding the costs of ageing. That makes it critical to test the sustainability of any fiscal strategy.

1.1. Blowout in many government debt positions

After the crisis, most advanced economies are confronting the reality of long periods of restrained government spending to reduce debt levels (see Figure 1). Such long periods of reduced government spending carry serious costs that reduce growth and impact on the ability of government to redistribute income.

Figure 1 Many advanced economies now face spending constraints to limit extended debt positions exacerbated by the Global Financial Crisis

General government gross financial liabilities as a percentage of GDP (OECD measure)



Source: NZIER, OECD

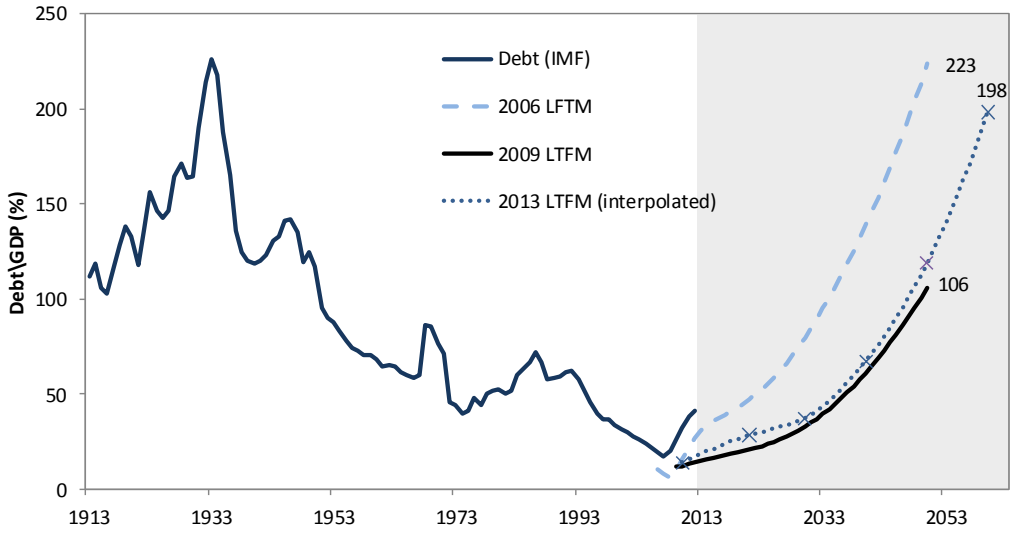
During the crisis, what many fiscal policymakers perceived to be sound balance sheets were quickly transformed into precarious positions in need of international assistance. So it is critical for governments to assess the risks and threats to the sustainability of fiscal commitments made today.

1.2. What New Zealand's future debt looks like

Figure 2 shows the paths for debt from successive long-term fiscal projections by the New Zealand Treasury. In the latest statement that uses the Long-Term Fiscal Model (LTFM) debt increases to 198 percent of GDP by 2060 – almost double what New Zealand produces in a year.

Figure 2 Treasury consistently recognises future liabilities are unfunded

Debt/GDP ratio. Forecasts are net debt excluding the Superfund from Long-term fiscal projections. Historical debt position is from the IMF long-term fiscal database (see Mauro et al. 2013)



NB. The path for 2013 is interpolated based on data points (marked with crosses) from Treasury's work that reports the debt level at ten-year intervals (see table 1, page 4 Treasury 2013, *Affording our future*).

Source: The Treasury, NZIER

Bell (2013) freezes the age composition of New Zealand's population and asks what does the debt profile look like if New Zealanders don't age? That frozen age scenario shows government debt would *fall* – so the future liabilities are entirely due to ageing.

Treasury's long-term fiscal projections are accounting models that simply add up liabilities based on a range of reasonable assumptions. Like other countries, these assumptions for future liabilities result in an explosive path for debt. That is a clear warning sign that change is required.

Like previous long-term fiscal projections, the debt figures in Treasury's *Affording Our Future* are not plans. Rather, the first section of Treasury's work shows that without making fiscal adjustments, the costs of ageing mean New Zealand cannot afford its current policies – current policy settings are not fiscally sustainable.

1.3. How we define sustainability

What do we mean by fiscal sustainability? There are several definitions:

- "…having the ability to maintain or support government programmes in the future" (New Zealand Treasury 2013)
- "…the ability of the government to meet both current and future obligations" (Barker 2008)
- The IMF define debt sustainability as: "…whether a country's debt can be serviced without an unrealistically large future correction in the balance of income and expenditure (IMF 2002)."

We take fiscal sustainability to be the ability of government to fund current and future obligations, that is, whether revenue will be sufficient to meet planned expenditure.

In general, to assess sustainability, countries face two key questions:

- How *responsive* is fiscal policy to changes in the debt position?
- How much *flexibility* – the room to shift fiscal settings like expenditure and taxation – exists?

1.4. What we do in this paper

This paper assesses fiscal sustainability for New Zealand. We take as given earlier work that shows how ageing will severely impact on the debt position of future governments (see for example, NZIER 2012, 2013a, 2013b and New Zealand Treasury 2013).

Section 2 lays out our framework for assessing sustainability and how we test for both flexibility and responsiveness.

Section 3 shows the results of assessing the flexibility of taxation and expenditure settings. We use the Laffer curve approach of Trabandt and Uhlig (2011, 2012) to assess taxation settings and find New Zealand has sufficient flexibility to shift taxation settings. We also discuss options for adjusting expenditure.

Section 4 first discusses results from Ostroy et al. (2010) that estimates New Zealand's sustainable debt limit based on the past behaviour of governments using panel data. We extend their efforts to test for the responsiveness of fiscal policy to debt by estimating a fiscal reaction function for New Zealand based on a century of debt and budgets. We find New Zealand has sufficient responsiveness to debt.

Finally, in Section 5 we summarise our assessment and draw some conclusions about how the debate about fiscal policy should be recast and the most fruitful areas for future research.

2. Our framework for assessing sustainability

Our framework comprises two tests for fiscal sustainability. First, fiscal settings need to be sufficiently flexible to ensure today's commitments are sustainable tomorrow. Second, fiscal policy needs to be sufficiently responsive to debt to ensure sustainability.

We define a given debt level as sustainable if:

i. the government demonstrates *responsiveness*, reducing debt by increasing the primary balance;[1] and

ii. the government has the *flexibility* to change taxation and expenditure settings to change the primary balance.

2.1. How we test if tax settings have sufficient flexibility

To ensure sustainability a requisite for government is to move the primary balance, that is, revenue minus spending, but excluding financing costs. Here, like elsewhere (see Leeper and Walker 2011, Trabandt and Uhlig 2011, 2012 and Park 2012), we take the government's expenditure as given and test the efficacy of raising tax rates to increase tax revenue and thus close the primary balance.

Countries with high consumption and labour taxes can find that increasing taxation rates is counter-productive. Typically revenue increases as taxation increases. But as taxation rates move ever higher, firms and workers have very little incentive to work and reduce activity so that taxation revenue falls.

The Laffer curve maps tax revenue against taxation rates and shows that increasing taxation rates from zero increases total revenue but ultimately total revenue starts to fall when higher and higher tax rates reduce the incentive to work (see Figure 3).[2] So any country needs to be on the upward sloping portion of the Laffer curve to increase taxation in response to shocks so that debt remains manageable.[3] Trabandt and Uhlig (2011, 2012) estimate the Laffer curves for the US and a range of euro area countries. We replicate their work for New Zealand.

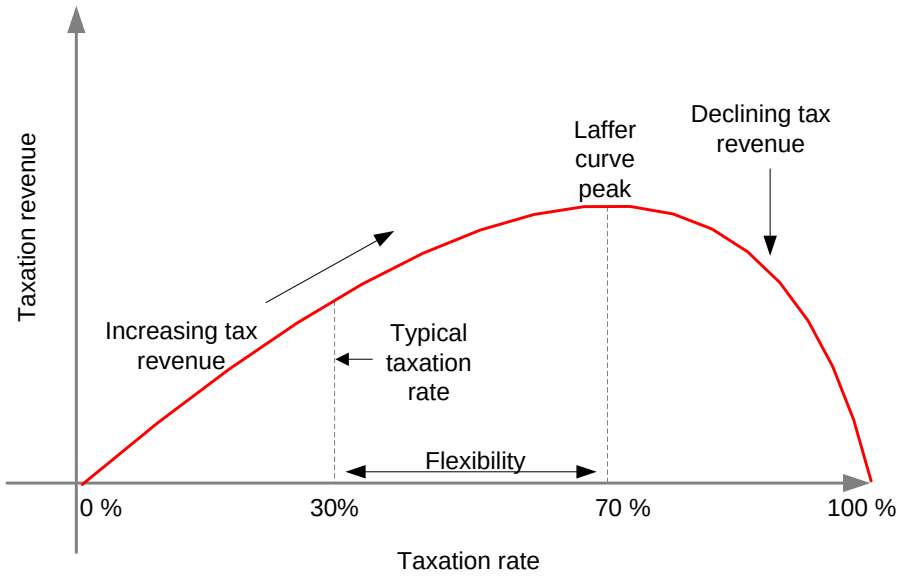
[1] The primary balance is government revenue minus government spending (excluding financings costs).

[2] The location of the peak is ultimately an empirical question – Stuart (1981) suggests a peak of 70 percent for the case of Sweden, which is used illustratively in Figure 1.

[3] This approach is entirely consistent with Leeper and Walker (2011) who define the debt limit as the point beyond which adjustments in tax rates alone cannot stabilise government debt.

Figure 3 Laffer curves map tax against revenue, peaking where revenue declines

Stylised Laffer curve representation, taxation is the average taxation rate from all sources



Source: NZIER

Being on the upward-sloping part of the Laffer curve is a necessary but not sufficient condition for sustainability. While governments might have the flexibility to return debt to sustainable levels, governments might not have the political will to implement the sets of policies required to return debt to manageable levels, for example, increasing income taxes.

Therefore, in order to assess New Zealand's fiscal sustainability, we augment our tests of fiscal flexibility. Governments concerned with extended debt positions will increase the primary balance to reduce debt. That means we can test for fiscal responsiveness by estimating a *fiscal reaction function* that relates the primary balance to debt.

Of course, to change the primary balance, governments can also adjust expenditure. So we also discuss flexibility on the expenditure side of the ledger, identifying specific policies that warrant closer attention.

2.2. How we test if fiscal policy is sufficiently responsive

Even though governments may have the tools to return debt to manageable levels, when debt is very high, the costs of reducing debt can be large.

The recent US shutdown of many federal programmes has been hard on government employees, sapping consumer confidence and creating uncertainty in financial markets. When the costs of adjustment increase, politics can trump the right economic course of action. For example, the US needs to decrease spending and increase taxation to control the future level of US debt – but neither option is politically attractive.

But by looking at how past governments have responded to rising debt levels, we can assess New Zealand's fiscal sustainability based on the *responsiveness* of government to rising debt limits over history.

That means using data on macroeconomic conditions to estimate a *fiscal reaction function*. This can then be used to assess how close current debt is to sustainable debt limits.[4,5]

Bohn (1995, 1998, 2005) estimates fiscal reaction functions to assess the sustainability of the US debt position. Bohn (1998) uses the behaviour of previous US governments over the past three centuries to estimate the sustainable debt level, beyond which the political costs of increasing the balancing the budget become simply too large. His earlier work suggests that point is not likely to bind very soon – the US appears to have ample room to respond based on the fiscal reaction function approach.

Ostroy et al. (2010) extend Bohn's (1998, 2005) approach by incorporating estimates of debt limits that take into account the costly adjustment that governments may have to make to return debt to sustainable levels. These adjustments may be very large and governments may lack the will, or as the shutdown of many federal programmes in the US shows, the political mandate to exact these policies.

Simply having the tools in the toolkit is not enough to ensure sustainability. Governments have to be willing to increase taxation revenue or reduce spending when debt increases. That makes for our responsiveness test of the sustainability of a particular fiscal position: if the government responds to debt in the same manner as history, will the path of debt explode or is it manageable and will reduce to lower levels?

This approach was developed by Bohn (1998) who found that three centuries of US data showed that the US debt position was sustainable based on how fiscal policy had responded to debt in the past. Bohn (1998) suggests "The most credible evidence in favour of sustainability is the robust positive response of primary surpluses to fluctuation in the debt-to-GDP ratio".

Box A shows the relationship between debt and the primary balance.

We then present our empirical results in the next two chapters. Chapter 3 assesses New Zealand's fiscal flexibility. Chapter 4 considers New Zealand's fiscal responsiveness to debt.

[4] We use the ratio of government debt-to-GDP as our standard measure.

[5] Sustainability is often interpreted as a one-for-one match with solvency. But the interest rate costs of debt are a real cost that reduces what governments can spend on education, health and infrastructure and other government expenditure. That can make it important to separate the costs of solvency from the costs of debt servicing when estimating fiscal reaction functions (see discussion in Mendoza and Ostroy 1994 and Ghosh et al. 2013).

Box A: Does the budget respond to debt? A robust test for fiscal responsiveness

One simple test for fiscal sustainability centres on how the primary balance is set in response to changes in the debt level.

Changes in the primary balance directly impact on future debt. So, if the government is serious about reducing debt, then revenue minus spending should rise in response to increases in the debt position.

To show this relationship Bohn (1995) and others (Lukkezen and Rojas-Romagosa 2012, Pradelli 2012) start with the accounting identity for the public debt stock:

$$\underbrace{D_{t+1}}_{\textit{next period debt}} = \overbrace{\left(\underbrace{D_t}_{\textit{this period debt}} - \underbrace{(T_t - G_t)}_{\textit{primary balance}}\right)}^{\textit{Government deficit}} \underbrace{(1 + R_{t+1})}_{\textit{interest payment}} \quad (1)$$

where D_t is the public debt stock at time t, T_t is total revenue and $G_t$is government expenditure. To scale nominal debt measures to the size of the economy, the equation (1) is usually expressed relative to GDP, that is:

$$\frac{D_{t+1}}{Y_{t+1}} = \left(\frac{D_t}{Y_t} - \frac{(T_t - G_t)}{Y_t}\right)(1 + R_{t+1})\frac{Y_t}{Y_{t+1}} \quad (2)$$

such that:

$$d_{t+1} = \underbrace{[d_t - (t_t - g_t)]}_{\textit{error correction term}} \underbrace{\left[\frac{(1 + r_{t+1})}{(1 + y_{t+1})}\right]}_{\text{"}\textit{snowball effect}\text{"}} \quad (3)$$

expresses next period's debt-to-GDP ratio d_t, as last period's debt, the primary balance $t_t - g_t$, and the so-called "snowball effect". The snowball effect shows that the evolution of the debt-to-GDP ratio is not simply a function of existing debt combined with the deficit, but is partly determined by nominal growth.

But equation (3) shows clearly the relationship between the revenue minus spending and the change in the debt to GDP ratio. This makes for a straightforward test of the responsiveness of fiscal policy: does the primary balance respond to changes in debt.

Bohn (1995) applies this test to three centuries of US data and finds in favour of the responsiveness of policy using an error correction approach. Others have used the same framework across a range of counties (for example, Cunado et al 2004 for a fractional integration approach to the US fiscal deficit, Kia 2008 applies the framework to Iraq and Turkey while Konings and van Arle 2011 look at the case of Belgium).

Other approaches include Ostroy et al. (2010) who leverage and then extend Bohn's (1995) approach by adjusting for the interest cost of debt. We use this approach to examine the case of New Zealand in Section 4.

3. Assessing fiscal flexibility

Fiscal flexibility requires the room to adjust taxation and expenditure settings so that the level of debt is manageable and the government can meet the commitments it makes now and in the future. We compare the flexibility of New Zealand's taxation settings against the United States and euro area countries using a simple model. We find that New Zealand has ample fiscal flexibility: taxes can adjust to increase the primary balance if required. We also discuss the flexibility of government expenditure.

3.1. How flexible are New Zealand's tax settings?

To compute the Laffer curves for New Zealand we use the neoclassical model of Trabandt and Uhlig (2011). That model (see Appendix A) is useful since it provides a direct comparison of the method with a range of other countries including the US and euro area countries.[6]

Our method is the following:

- use data to determine New Zealand's steady-state – the long-run or equilibrium model properties, including labour's share of income, the elasticity of labour supply and government's share of output
- calibrate and solve the model for rules that map tax changes to tax revenue
- trace out the Laffer curve by moving taxes from 0 to 100 percent
- calculate fiscal flexibility by comparing the peak of the Laffer curve to existing labour and capital taxation rates.

Figure 4 shows the Laffer curves for capital taxation for a selection of countries provided by Trabandt and Uhlig (2011). Trabandt and Uhlig (2011) notes that it is labour and consumption taxes that generate cross-country differences in Laffer curves.

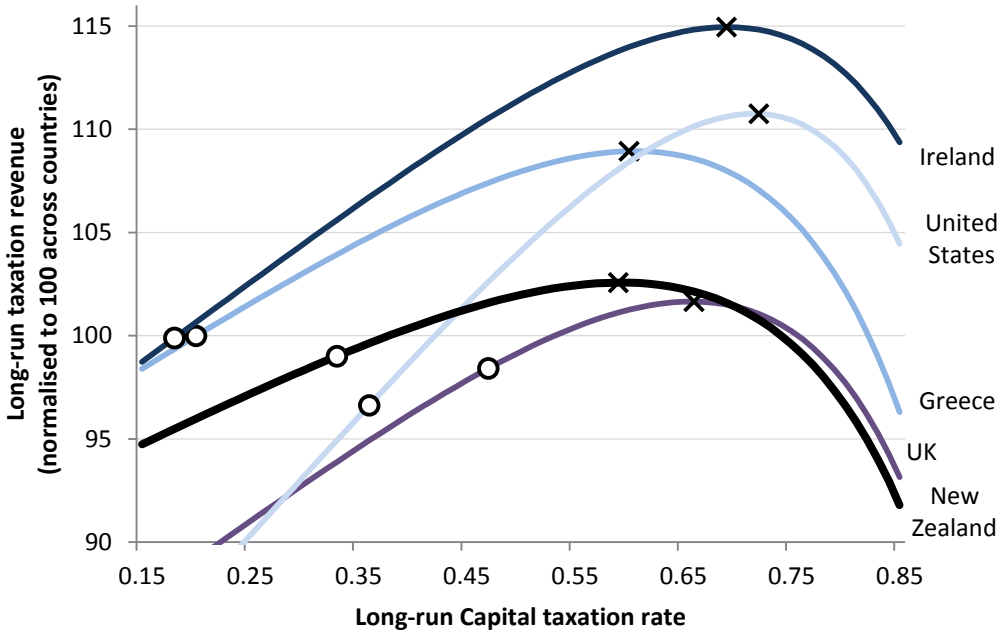
We calculate the Laffer curves for New Zealand by calibrating a model of the economy and simulating tax revenue when taxation rates change.

Our results show that while the peak of the Laffer curve for capital taxation is lower than for other countries (denoted with an 'x' at 0.60 cents in the dollar) New Zealand still has ample room to raise capital taxes relative to current taxation (denoted with a circle).

[6] See Trabandt and Uhlig (2011) for the data methodology and Appendix A for the model we adopt to trace out the curve. That approach uses a variety of international databases to calculate taxation rates. Including supplements to wage income (like social security for the United States) and a fraction of taxation on entrepreneurial income, shifts labour taxation higher for most countries.

Figure 4 New Zealand has ample flexibility to adjust capital taxation higher

Cross-country capital taxation Laffer curve comparison using the Trabandt and Uhlig (2011) model



Circles show average taxation position over 1995-2010, crosses show the Laffer curve peak

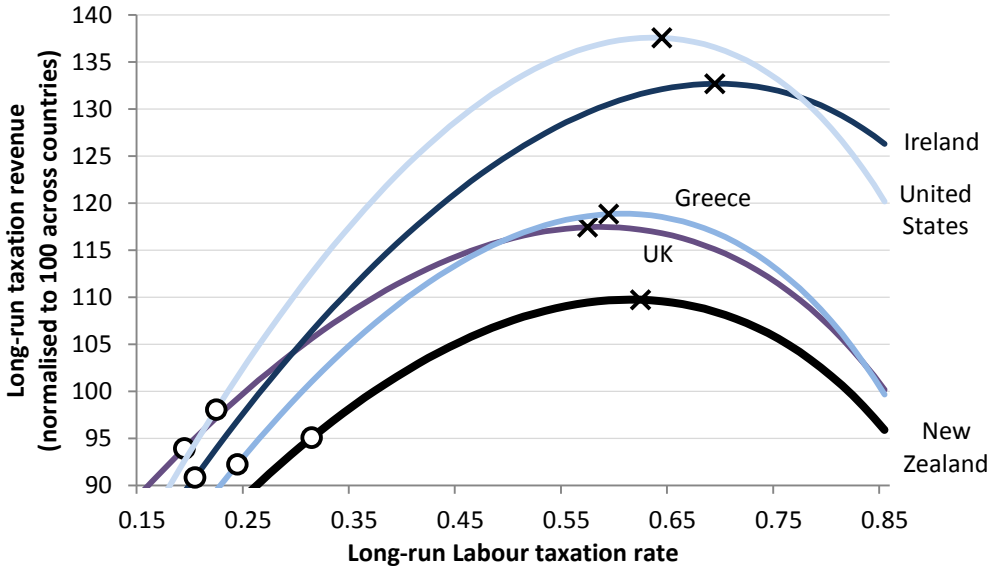
Source: NZIER, Trabandt and Uhlig (2011)

Importantly, Figure 4 says nothing about what is the *optimal* rate of capital taxation. Instead, Figure 4 identifies the extent to which taxation can act as a lever to increase revenue and reduce debt.

Figure 5 shows the cross-country Laffer curves for labour taxation. The comparisons show that some countries, Greece for example, have limited flexibility to increase revenue via labour taxation to help reduce debt.

Figure 5 New Zealand has ample flexibility to adjust labour taxation higher

Cross-country labour taxation Laffer curve comparison using the Trabandt and Uhlig (2011) model



Circles show average taxation position over 1995-2010, crosses show the Laffer curve peak

Source: NZIER, Trabandt and Uhlig (2011)

Figure 5 shows that if required, New Zealand has ample flexibility to manage shocks. Labour taxation can increase to boost revenue if necessary. Arithmetically, taxation rates could increase to 62 percent before reducing taxation revenue.

Like the case of capital taxation rates, the Laffer curve says nothing about the optimal rate of labour taxation or how taxes affect economic growth.

The revenue from taxation revenue helps provide public goods and redistribute income for equity purposes.

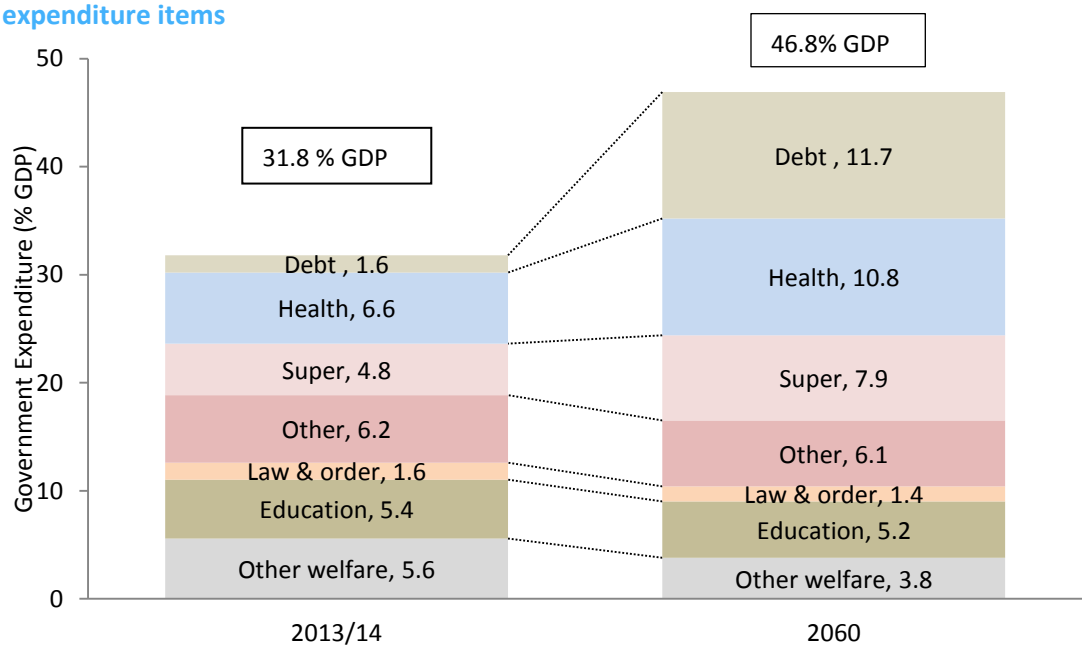
But the evidence is clear – higher rates of taxation reduce the incentive to work, lower savings and crimp innovation and entrepreneurship (see OECD 2010, for example) within the economy. So there is a trade-off – too much debt risks economic growth, and higher taxation rates also reduce economic growth.

Our work focuses on adjustments to capital and labour taxation only. Broadening the tax base, such as implementing a tax on land or a tax on capital gains, is also worthy of close consideration.

3.2. How flexible is expenditure?

The reality is much government expenditure is political rather than flexible. But Figure 6 shows the costs of ageing produce a dramatic increase in many key expenditure groups by 2060 as a fraction of GDP.[7] So either tax needs to rise dramatically, or we need to cut expenditure – we can't continue to do everything.

Figure 6 Ageing increases the share of GDP allocated to key government expenditure items



Source: NZIER, New Zealand Treasury

Two measures that look worthy of further investigation are:

- removing interest free student loans
- better targeting welfare payments to those most in need.

It is far from clear that interest free student loans deliver improvement in tertiary educational attainment.[8] Since the interest bill on the outstanding stock of loans could be as much as $500 million each year, the policy looks like questionable use of public money (see de Raad 2011) that might be spend elsewhere such as early childhood education or heath care.

New Zealand's Working for Families policy has reduced child poverty but our earlier analysis (see Zeng and de Raad 2011) suggests this package is very poorly targeted – middle-class earners pick up most of the spending. Reallocating this spending towards lower income families would provide better value-for-money.

Ultimately we need to find agreement to change either spending or taxation to ensure the policy commitments made today endure.

[7] These figures are from the 2013 Budget Statement and New Zealand Treasury (2013).

[8] The Ministry of Education (2010) note: "The Participation in tertiary education by domestic students has declined since 2005, but despite this, the number of eligible students actually borrowing from the loan scheme has increased steadily over this period. The rise is largely due to the introduction of the interest-free loans policy from 2006 onwards." So the availability of interest-free student loans is unlikely to have materially lifted participation in tertiary study.

4. Assessing the responsiveness of fiscal settings

Fiscal sustainability requires not just the tools to adjust the primary balance (i.e. flexibility of taxation and expenditure settings) but the ambition and willingness of government to adjust budgets in response to increasing debt. We use the historical responsiveness of government to pin down a debt limit beyond which government is unlikely to be able to balance the budget. Above this limit debt dynamics become explosive. We estimate such a debt limit and find that New Zealand has ample room before debt becomes unmanageable.

4.1. Does Government have the will to respond?

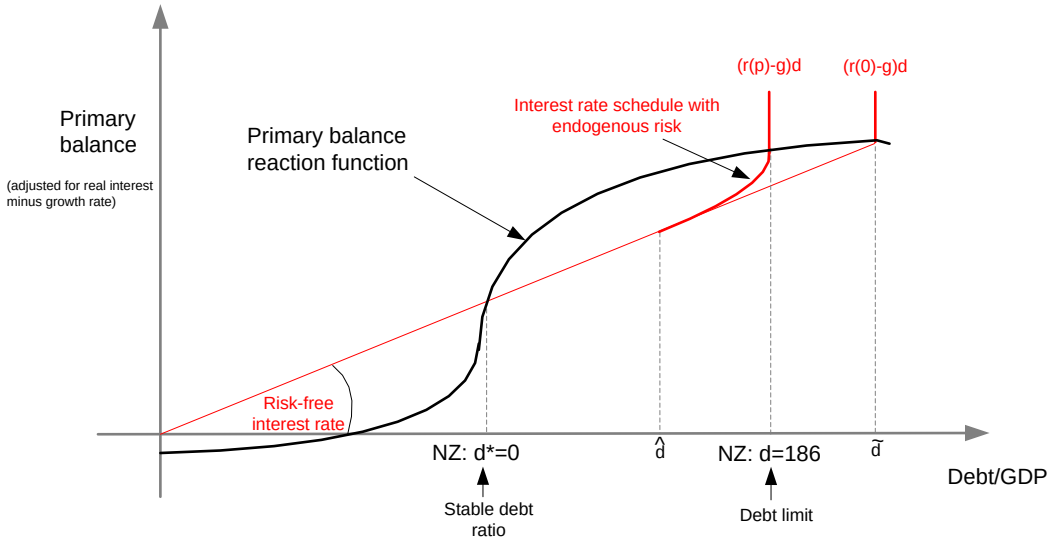
Ostroy et al. (2011) note empirical evidence (Abiad and Ostroy 2005 and Mendoza and Ostroy 2008) that suggests the responsiveness of the budget to debt is weaker at high levels of debt. And the cost of borrowing typically increases at high debt levels.

Figure 7 illustrates their approach to estimating debt limits. They map the budget (adjusted for financing costs, the real interest rate and growth rate of the economy) against the debt-to-GDP ratio. Their approach endogenises the private sector's response to rising debt-to-GDP levels – adding an interest rate schedule with endogenous risk.

So when debt levels are high (above $\hat{d}$ in the figure) each additional unit of debt requires additional increases in revenue minus spending to finance increased debt servicing costs across the entire stock of debt. If there is no additional premium imposed by the private sector at high debt levels then the debt limit can be high (at $\tilde{d}$ in Figure 7). The stable debt ratio, labelled d*, shows the level that debt converges to in the long-run when the government moves the primary balance in response to debt.

Figure 7 The estimated debt limit shows New Zealand's fiscal policy is responsive

Primary balance=Government revenue – government spending less debt servicing



Source: Ostroy et al. (2011)

Ostroy et al. (2011) use data from 1970-2007 from 23 countries to estimate fiscal reaction functions that include a nonlinear response to debt.

They use panel data to estimate the responsiveness of the primary balance to:

- lagged debt
- the output gap
- trade openness
- inflation
- age dependency.

Prior to the Christchurch earthquake, they report (shown in Figure 7) a sustainable debt limit of a projected 186.4 percent of GDP. Net core crown debt was estimated at 27.1 percent of GDP in the May 2013 budget So based on the past responsiveness of fiscal policy, New Zealand appears to have ample room.

Ostroy et al. (2011) note that among the countries they look at, Australia, Denmark, Korea, New Zealand and Norway generally have the most room to deal with shocks while Greece, Italy, Japan and Ireland have the least room between the estimated debt limit and where debt is expected to be in 2015. Table 1 shows some of the results against selected OECD peers.

Table 1 Australia and New Zealand are well-positioned relative to OECD peers

Based on projected 2015 debt level

Country	Debt 2015	Stable debt d*	Debt limit d'
Australia	20.9	0.0	193.2
Canada	71.2	82.6	181.1
Greece	158.6	n/a	n/a
Ireland	94.0	90.7	149.7
United Kingdom	90.6	94.9	166.5
United States	109.7	101.0	160.5
New Zealand	**36.1**	**0.0**	**186.4**

Source: Ostroy, Ghosh, Kim and Qureshi (2011)

What should we think about the massive gap between New Zealand's current debt level and the debt limit in Table 1? The Government is at no risk of immediate default. This is not surprising. The New Zealand Government has never defaulted to foreign investors over its relatively short history.[9]

Many commentators are concerned about New Zealand's highly negative Net Foreign Asset position. But international investors have been prepared to finance New Zealand's current account deficit for decades. And the revised Net Foreign liabilities position is not large compared to history. New Zealand's current public debt position will not trigger a default any time soon.

So there is ample room to move on debt and our short-term vulnerabilities have eased. It is time to focus attention on the required adjustment to the rising costs of ageing.

4.2. A century of data, a century of responding to debt

To dig deeper into the New Zealand case we use the hundred years of data from the IMF long-run debt database (see Mauro et al. 2013).

That data shows New Zealand has a long history as an indebted country (see Figure 8). New Zealand's pioneering history established a tradition of loans from the United Kingdom to finance a developing country. Indeed, much of government expenditure was in the form of financing loans to private developers to provide infrastructure across New Zealand.

Debt was high – at 100 percent of GDP prior to World War I and peaking at 226 percent of GDP in 1933 – when weak foreign and domestic demand collapsed incomes at the height of the great depression.

[9] Reddell (2012) recounts the 1933 Government debt restructure that imposed lower interest rates on domestic holders of New Zealand Government debt, although it is hard to see this event as an outright default.

New Zealand was able to avoid outright default with favourable financing terms on some loans from Britain helping keep costs of borrowing relatively low given the level of indebtedness (see Figure 8 and Reddell 2012 for more discussion).

After World War II debt declined slowly over the 1950s and 1960s to 43 percent of GDP in 1973. Debt increased again through the 1970s when revenue failed to keep up with expenditure even when stripping out debt financing (see Figure 10).

Debt continued to decline through the 1990s and most of the 2000s. Some of this decline might be attributable to the 1994 Public Finance Act that introduced regular fiscal reporting including budget policy statements to increase fiscal transparency.

The most recent years show the impact of the Global Financial Crisis weakening demand (see Figure 11) and the impact of the Christchurch earthquakes on the government balance sheet.

We use this history to detect the extent to which budgets respond to debt expressed as a fraction of GDP.

We also test the extent to which fiscal policy responds to or is unrelated to the business cycle. We expect budgets to be at least positively related to the cycle since revenue increases in good times and expenditure falls.

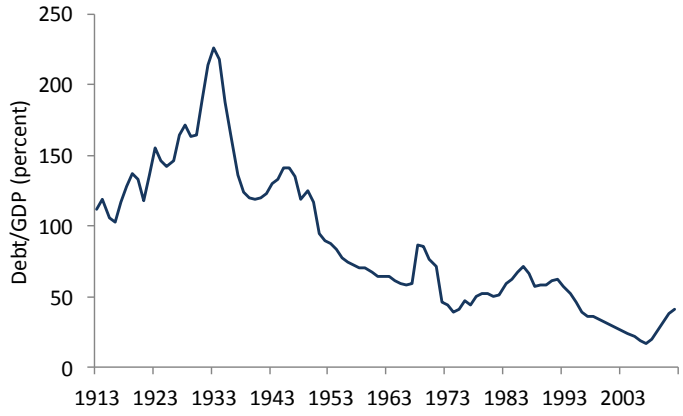
More technically we use the primary balance – government revenue minus government spending (excluding financing costs) in our regression so that, bal_t:

$$bal_t = \beta_1 bal_{t-1} + \beta_2 gap_{t-1} + \beta_3 \left[\frac{debt_{t-1}}{GDP_{t-1}} - \frac{debt}{GDP}\right] + \varepsilon_t \quad (4)$$

where $bal_{t-1}$is the primary balance from the previous year, (see Figure 9), gap_{t-1} is last year's business cycle and the term $\left[\frac{debt_{t-1}}{GDP_{t-1}} - \frac{debt}{GDP}\right]$ is last period debt-to-GDP ratio relative to a target for debt.

Figure 8 New Zealand's debt has declined after the second world war

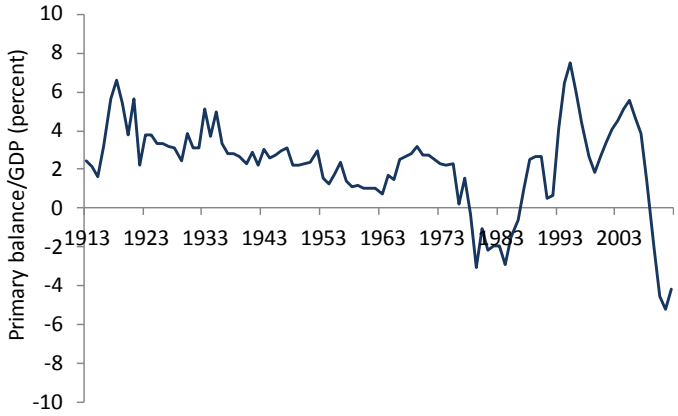
Net debt/GDP ratio



Source: IMF long-run debt dataset, Statistics New Zealand

Figure 9 Global Financial Crisis and earthquakes dent the primary balance

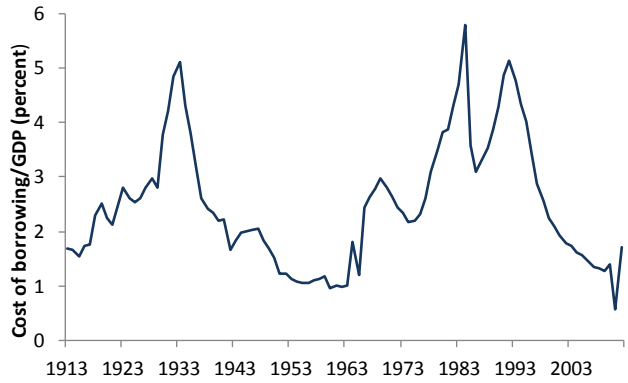
Primary balance as a fraction of GDP



Source: Treasury, NZIER

Figure 10 Debt servicing costs have declined steadily since the early 1990s

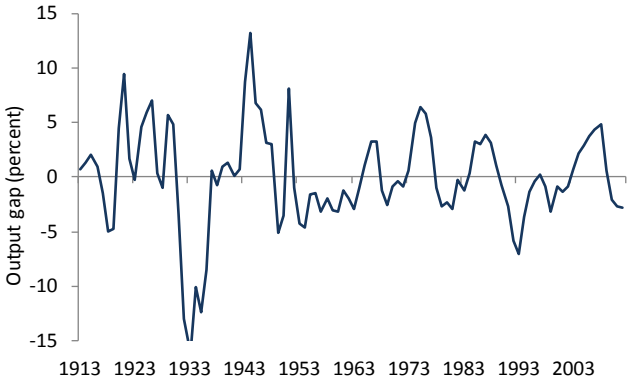
Debt servicing costs as a fraction of GDP



Source: IMF long run database, Statistics New Zealand

Figure 11 The great depression shows through clearly in our output gap measure

Hodrick-Prescott filtered output gap (λ=400)



Source: IMF long run database, Statistics New Zealand

Table 2 shows our results. The size of the primary balance is sticky. Since this year's spending and taxation decisions are closely related to last year's decisions the size of the primary balance will be similar to the year before.

The primary balance does not appear to respond strongly to the business cycle. The last row of the table shows that we should expect governments of the future to respond to rising debt by adjusting fiscal settings.

Table 2 Our results show New Zealand governments responded to debt over history

Results based on yearly data for 1913-2012.

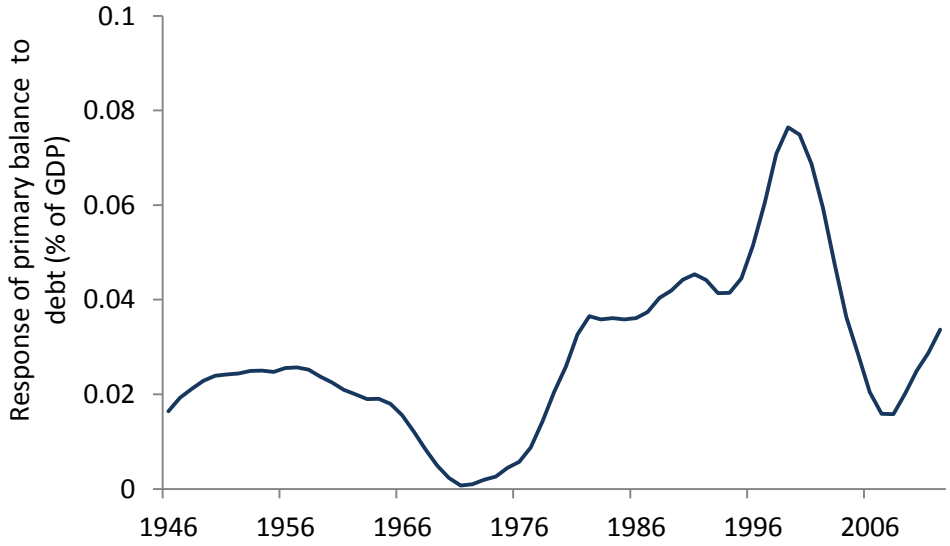
Parameter	Estimate	*p*-value	Interpretation
β_1	0.861	(0.001)	The primary balance is sticky.
β_2	0.032	(0.641)	The primary balance doesn't respond to the cycle.
β_3	0.034	(0.071)	The primary balance responds to debt.

Source: NZIER

Over the past century, successive governments have changed fiscal policy to return debt to sustainable levels.

To test how the responsiveness of fiscal policy has changed over successive decades and regimes, we estimate a time-varying version of equation (1) over successive rolling windows of forty years. Figure 12 shows the responsiveness of the primary balance to debt changed over time but is positive through the entire period – New Zealand governments generally adjust the primary balance when debt gets too high.

Figure 12 New Zealand ramped up the response to debt since the 1970s



Source: NZIER

After a period of negative terms-of-trade shocks when the price of oil increased in the early 1970s, fiscal policy was relatively active and discretionary through the 1970s and 1980s (see Janssen 2001, for example). Figure 11 shows that the response

to debt ebbed to almost zero in the early 1970s but then recovered in the latter part of the 1970s after the main impact of the terms-of-trade shocks had dissipated.

Our estimates suggest a material impact of three pieces of legislation that helped consolidate the debt position (see Janssen 2001):

- the State-owned Enterprises (SOE) Act 1986 that helped reduce costs and increase revenue from government services that could be commercialised
- the State Sector Act 1988 (SSA) that increased accountability for performance of the state sector
- the Public Finance Act 1989 (PFA) that required governments to set both short- and long-term objectives.

The primary balance then responds to debt increases in the mid-to-late 1990s before declining from the late 1990s due to tax cuts (see Parkyn 2010, for example).

Fiscal policy generally does the right thing in terms of managing debt. But while 20 percent of GDP seems like a reasonable target given New Zealand's current debt servicing costs it is the future costs of today's plans that are the metric to assess sustainability.

5. Conclusion

What our work shows

Right now, New Zealand's government debt stands at 26.3 percent of GDP – low compared to many OECD countries. Our work demonstrates that the debt position and the flexibility to move taxes means the New Zealand government's balance sheet is in good stead to withstand future shocks regardless of whether they originate from our key trading partners or domestically.

While many other countries face difficult decisions to manage precarious balance sheets in risk of default, the Government is unlikely to default on debt obligations. Instead, the cost of financing the future costs of ageing should motivate putting in place policies that mean we can afford tomorrow the commitments made today.

Our work with 100 years of data shows that New Zealand governments do respond – the primary balance increases when debt rises. So expect future changes in expenditure and taxation as ageing starts to crimp what we can afford as a nation.

So what does government need to do?

What governments can do is better articulate how today's commitments will be afforded in the future. That reduces uncertainty for decision-making by both households and firms, promoting better outcomes.

Much of the recent debate on New Zealand's fiscal policy settings has centred on vulnerabilities and the risk of default. But we show current debt levels are sustainable and the risk of default is low as:

- the government has the policy levers to make the necessary adjustments
- history shows to expect the government to respond to increasing debt by making the necessary adjustments to raise the primary balance.

This means it is appropriate to recast fiscal policy debate away from short run vulnerability and squarely onto fiscal policies that close the long-run structural gap between expenditure and revenue, such as reducing the costs of superannuation.

Articulating a plan early helps workers and businesses plan for future scenarios, reducing uncertainty about the types of interventions that might be required. Developing the plan sooner rather than later will reduce the risk of the political costs of change rising too far. As the US experience shows, high political costs can cause severe economic problems.

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Appendix A Neoclassical model

The equations below outline the standard neoclassical model used to calculate the Laffer curves in Figures 5 and 6.

$$\max_{\{c_t,n_t,k_t,x_t,b_t\}} \sum_{t=0}^{\infty} \beta^t \left[u(c_t,\eta_t)+v(g_t)\right] \quad (3)$$

subject to

$$(1+\tau_t^c)c_t + x_t + b_t = (1-\tau_t^n)w_t n_t + (1-\tau_t^k)(d_t-\delta)k_{t-1} + R_t b_{t-1} + s_t + \Pi_t + m_t \quad (4)$$

$$k_t = (1-\delta)k_{t-1} + x_t \quad (5)$$

$$\max_{\{k_{t-1},n_t\}} y_t - d_t k_{t-1} - w_t n_t$$

$$y_t = \xi k_{t-1}^{\theta} n_t^{1-\theta}$$

where y_t denotes output, ξ is total factor productivity, and θ denotes capital share in the production function.

The government collects tax revenue (T_t) and spends for expenditure (g_t), subsidy (s_t) and debt services

$$g_t + s_t + R_t b_{t-1} = b_t + T_t$$

$$T_t \equiv \tau_t^c c_t + \tau_t^n w_t n_t + \tau_t^c[(d_t-\delta)k_{t-1} + \phi\Pi_t]$$

The optimisation conditions are:

$$u_n(t) = -\frac{(1-\tau_t^n)}{(1+\tau_t^c)} u_c(t),$$

$$1 = E_t\left[\beta \frac{(1+\tau_t^c)}{(1+\tau_{t+1}^c)} \frac{u_c(t+1)}{u_c(t)} \{(1-\tau_{t+1}^{\kappa})(d_{1+1}-\delta)+1\}\right]$$

$$E_t\left[\beta \frac{1+\tau_t^c}{1+\tau_{t+1}^c} \frac{u_c(t+1)}{u_c(t)} R_{t+1} =\right] 1$$

$$d_t = \theta \frac{y_t}{k_{1-1}},$$

$$w_t = (1-\theta)\frac{y_t}{n_t}$$

$$\overline{T/y} = \tau^c \overline{c/y} + \tau^n(1-\theta) + \tau^k(\theta - \delta\overline{k/y})$$

which can be used to generate Laffer curves as in Trabandt and Uhlig (2011) and Park (2012):

$$\bar{T}(\tau^n,\tau^k) = \overline{T/y} \times \bar{y}$$